

# Nilay Kushawaha

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## Profile Summary

Final-year doctoral research candidate in Continual Learning and Robotics with a strong track record in designing adaptive AI algorithms for robotic control, multimodal data fusion, and soft robot behavior modeling. Experienced in real-time control, reinforcement learning, and sensor data processing. Proven ability to bridge theory and practice through publications in top-tier journals and hands-on robotics experiments. Passionate about translating cutting-edge research into impactful real-world applications.

## Work Experience

**Visiting Researcher, National University of Singapore, Singapore** *June 2025 – September 2025*  
*(Prof. Cecilia Laschi)* [🔗](#)

- Developed dynamic continual learning algorithm for modular soft robot (MSR) to enable localized precise control.
- Tested the controller in real-time for trajectory tracking and dynamic reaching tasks, achieving an error less than 6 mm in position and 3° in orientation.

**Master's Thesis Project, Jefferson Lab, U.S.A** *July 2021 – July 2022*  
*(Dr. Yulia Furletova)* [🔗](#)

- Simulated and modeled the Gas Electron Multiplier (GEM) detector for [Electron-Ion Collider](#) [🔗](#) project.
- Applied AI algorithm for extracting sensitive particle signals from high-noise environment, improving detection accuracy.

## Education

**The Biorobotics Institute, Scuola Superiore Sant'Anna, Pisa, Italy** *Oct 2022 – April 2026*  
*PhD in Biorobotics & AI (Supervisor : Prof. Egidio Falotico)* [🔗](#) (Tentative)

- Credits : 20/20
- Coursework: Machine Learning, Brain Inspired Control, Finite Elements Methods, Deep Learning for Medical Imaging, Robot Programming, Ethics in AI.

**Indian Institute of Technology, Indore, India** *July 2020 – July 2022*  
*Master of Science (M.Sc) in Physics (Supervisor : Prof. Ankhi Roy)* [🔗](#)

- CGPA : 8.65/10
- Coursework: Mathematical Physics, Statistical Mechanics, Classical Mechanics, Quantum Mechanics, Detector Physics.

**University of Delhi, Delhi, India** *August 2017 – July 2020*  
*Bachelor of Science (B.Sc) in Physics*

- CGPA : 8.46/10
- Coursework: Numerical Methods, Introduction to Programming, Computational Physics, Digital/Analog Electronics, Modern Physics.

## Selected Publications and Pre-Prints

- SynapNet: A Complementary Learning System Inspired Algorithm With Real Time Application in Multimodal Perception, **Nilay Kushawaha**, L. Fruzetti, E. Donato, E. Falotico, *IEEE Transactions on Neural Networks and Learning Systems* (2024), [Paper link](#) [🔗](#)
- Continual Learning for Multimodal Data Fusion of a Soft Gripper, **Nilay Kushawaha**, E. Falotico, *Wiley Advanced Robotics Research* (2025), [Paper link](#) [🔗](#)
- AGPNN: A Dynamic Architecture based Continual Reinforcement Learning Algorithm for Robotic Control, **Nilay Kushawaha**, G. Perovic, E. Donato, E. Falotico, *Under Review (IEEE Transactions on Systems, Man,*

### *and Cybernetics: Systems)*

- SMPL: A Continual Learning Approach for Dynamic Modeling of Modular Soft Robots, **Nilay Kushawaha**, S. Nazeer, C. Laschi, E. Falotico, *Under Review (IEEE Robotics and Automation Letters (RAL))*
- Adaptive Drift Compensation for Soft Sensorized Finger Using Continual Learning, **Nilay Kushawaha**, R. Pathan, N. Pagliarani, M. Cianchetti, E. Falotico, *IEEE Robosoft Conference (2025)*, [Paper link ↗](#)
- Domain Translation of a Soft Robotic Arm Using Conditional Cycle Generative Adversarial Network, **Nilay Kushawaha**, C. Alessi, L. Fruzetti, E. Falotico, *IEEE International Conference on Robotic Systems and Applications (2025)*, [Paper link ↗](#)

## **Skillset**

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**Programming Languages :** Python, C++, Scilab, SQL

**AI Skills :** Machine Learning, Deep Learning, Continual Learning, Reinforcement Learning, Generative AI, Data-driven Control

**Platforms & Misc. :** VSCode, Pytorch, Arduino, Basics of Ethical Hacking, ROS 1, Labview, Franka ROS, Scikit-learn, Numpy, Pandas, Github, HTML5, CSS, Latex

**Soft Skills:** Leadership, Teamwork, Adaptability

## **Training & Certifications**

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- Advanced Course on Data Science & Machine Learning (Italy, 2024).
- Fundamentals of Deep Learning (Nvidia, India, 2021).
- 1st Indian Workshop on Artificial Intelligence (IIT Indore, India, 2021).

## **Organizational & Supervision Activities**

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- Supervised 6 students on a project for the course "[Introduction to Robotics & AI](#)" ↗, taught by Dr. Falotico.
- Created 4 hour tutorial video on "Advancements in Continual Learning for Robotics" for the [Ebrains-Italy](#) ↗ project.
- Student Coordinator, Dept. of Physics, IIT Indore.
- Robotics Club Coordinator, University of Delhi.

## **Achievements & Awards**

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- Recipient of [Enfield](#) ↗ AI Scholarship 2025 for exchange.
- Recipient of full PhD scholarship at Scuola Superiore Sant'Anna.
- Recipient of Ishan Uday undergraduate scholarship for 3 consecutive years.
- Undergraduate 2<sup>nd</sup> semester examination topper.

## **Academic Service (Reviewer For)**

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- ICRA 2026
- IROS 2025
- IEEE Transactions on Neural Networks and Learning Systems
- IOP Measurement Science and Technology